# Experiment-5

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**Semester:** 6th
**Date of Performance:**
**Subject Name:** PBLJ-Lab
**Subject Code:** 22CSH-359

## 1. Aim:

Develop Java programs using autoboxing, serialization, file handling, and efficient data processing and management.

a.) Write a Java program to calculate the sum of a list of integers using autoboxing and unboxing. Include methods to parse strings into their respective wrapper classes (e.g., Integer.parseInt()).

b.) Create a Java program to serialize and deserialize a Student object.
The program should:
Serialize a Student object (containing id, name, and GPA) and save it to a file.
Deserialize the object from the file and display the student details.
Handle FileNotFoundException, IOException, and ClassNotFoundException using exception handlingCreate a program to collect and store all the cards to assist the users in finding all the cards in a given symbol using Collection interface.

c.) Create a menu-based Java application with the following options. 1.Add an Employee 2. Display All 3. Exit If option 1 is selected, the application should gather details of the employee like employee name, employee id, designation and salary and store it in a file. If option 2 is selected, the application should display all the employee details. If option 3 is selected the application should exit.

## 2. Objective:

Develop Java programs using autoboxing, serialization, file handling, and efficient data processing and management.

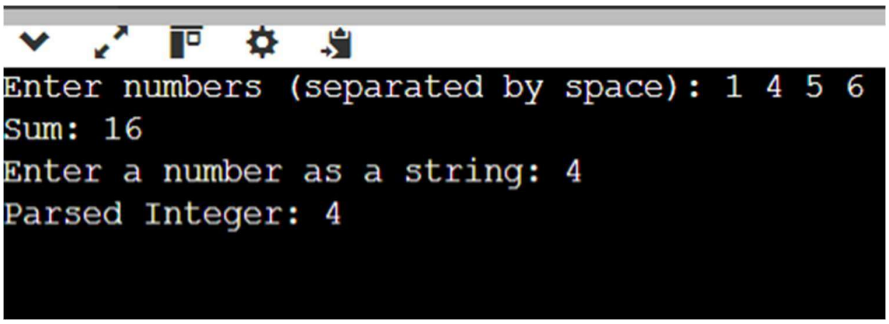
1. Implement autoboxing/unboxing to compute the sum of integers from a list and parse strings to wrapper classes.
2. Serialize a Student object (id, name, GPA) to a file and deserialize it back, handling exceptions properly.
3. Create a menu-driven employee management system that adds, stores, and retrieves employee data using file handling.

## 3. Implementation/Code:

### a.) Sum of Integers

```
import java.util.*;

public class AutoBoxingExample {
    public static int calculateSum(List<Integer> numbers) {
        int sum = 0;
        for (int num : numbers) sum += num;
        return sum;
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        List<Integer> nums = new ArrayList<>();
        System.out.print("Enter numbers (separated by space): ");
        String[] inputs = sc.nextLine().split(" ");
        for (String str : inputs) nums.add(Integer.parseInt(str));

        System.out.println("Sum: " + calculateSum(nums));

        System.out.print("Enter a number as a string: ");
        String strNum = sc.next();
        int parsedNum = Integer.parseInt(strNum);
        System.out.println("Parsed Integer: " + parsedNum);
    }
}
```

**Output :**

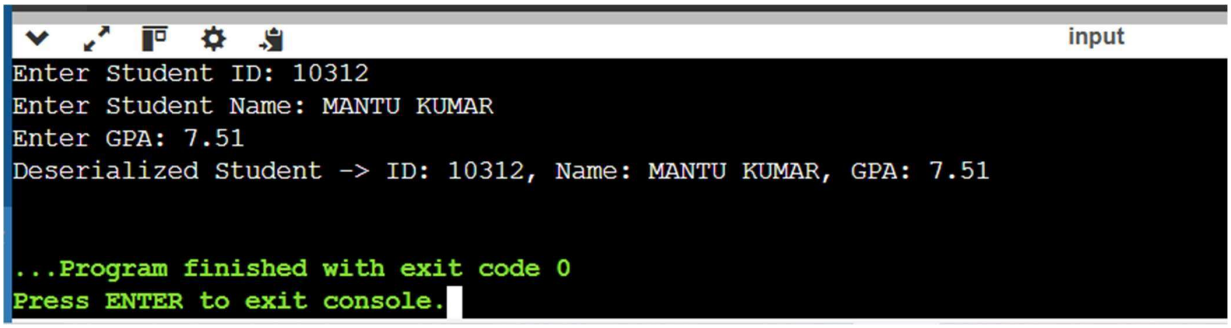



**b.) Student managenment:**

```
import java.io.*;
import java.util.Scanner;

class Student implements Serializable {
   int id;
   String name;
   double gpa;
   Student(int id, String name, double gpa) { this.id = id; this.name = name; this.gpa =
gpa; }
}

public class StudentSerialization {
   static final String FILE = "student.dat";

   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter Student ID: "); int id = sc.nextInt();
      sc.nextLine();
      System.out.print("Enter Student Name: "); String name = sc.nextLine();
      System.out.print("Enter GPA: "); double gpa = sc.nextDouble();

      try (ObjectOutputStream out = new ObjectOutputStream(new
FileOutputStream(FILE))) {
          out.writeObject(new Student(id, name, gpa));
       } catch (IOException e) { e.printStackTrace(); }

      try (ObjectInputStream in = new ObjectInputStream(new FileInputStream(FILE))) {
         Student s = (Student) in.readObject();
         System.out.println("Deserialized Student -> ID: " + s.id + ", Name: " + s.name +
```

```
", GPA: " + s.gpa);
        } catch (IOException | ClassNotFoundException e) { e.printStackTrace(); }
    }
}
```

**Output:**

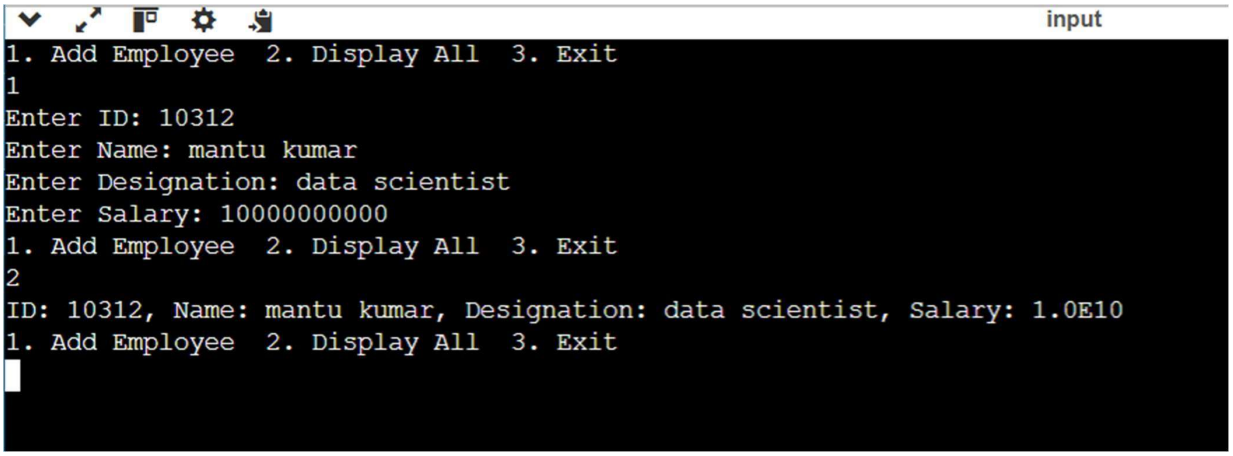



**c.) Employee Management System:**

```
import java.io.*;
import java.util.*;

class Employee implements Serializable {
    int id; String name, designation; double salary;
    Employee(int id, String name, String designation, double salary) { this.id = id;
this.name = name; this.designation = designation; this.salary = salary; }
}

public class EmployeeManagement {
    static final String FILE = "employees.dat";

    public static void addEmployee() {
        try (FileOutputStream fos = new FileOutputStream(FILE, true);
             ObjectOutputStream out = new ObjectOutputStream(fos)) {
            Scanner sc = new Scanner(System.in);
            System.out.print("Enter ID: "); int id = sc.nextInt();
            sc.nextLine();
            System.out.print("Enter Name: "); String name = sc.nextLine();
            System.out.print("Enter Designation: "); String desig = sc.nextLine();
            System.out.print("Enter Salary: "); double salary = sc.nextDouble();
            out.writeObject(new Employee(id, name, desig, salary));
        } catch (IOException e) { e.printStackTrace(); }
```

```
    }

    public static void displayEmployees() {
        try (FileInputStream fis = new FileInputStream(FILE);
             ObjectInputStream in = new ObjectInputStream(fis)) {
            while (true) {
                Employee e = (Employee) in.readObject();
                System.out.println("ID: " + e.id + ", Name: " + e.name + ", Designation: " +
e.designation + ", Salary: " + e.salary);
            }
        } catch (EOFException e) {} catch (IOException | ClassNotFoundException e) {
e.printStackTrace(); }
    }

    public static void main(String[] args) {
        Scanner sc = new Scanner(System.in);
        while (true) {
            System.out.println("1. Add Employee  2. Display All  3. Exit");
            int choice = sc.nextInt();
            if (choice == 1) addEmployee();
            else if (choice == 2) displayEmployees();
            else break;
        }
    }
}
```

**Output :**



## 4. Learning Outcome:

**A.** Understand autoboxing and unboxing for seamless conversion between primitive types and wrapper classes.

**B.** Implement serialization and deserialization to persist and retrieve Java objects efficiently.

**C.** Utilize file handling for storing and managing structured data in a menu-driven application.

**D.** Apply exception handling to manage runtime errors and ensure program stability.

**E.** Develop interactive Java applications with user input processing and data persistence.